Invertebrata

Tasmania's Invertebrate Newsletter

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Answers (p. 9):

A = female VIII (20-ring)
B = male VII. First pair of legs not drawn.

March 2000
No. 16

Invertebrata is produced by the Queen Victoria Museum and Art Gallery, Launceston, Tasmania.

We publish articles and short notes on all aspects of invertebrate biology and conservation in Tasmania.

All correspondence (including changes of address) to the editor,
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Draw an insect!

At the Australian Entomological Society's conference last October, Gina Dillon presented a paper entitled 'The Draw-An-Insect Test'. The work reported was carried out in two primary schools in Narrabri (country NSW) on children in kindergarten (5-6 year olds) and year 4 (9-10 year olds).

Dillon said that past studies have shown that it is rare for schoolchildren to go on to become entomologists. It may be that children's exposure to insects has been minimal or negative; perhaps at a critical age. Traditionally, through diverse media, public interest in natural history has focused on vertebrates, especially birds and mammals. The purpose of this study was to ascertain children's perceptions of insects.

The children were asked to draw an insect. No special preparation in entomology was given to the children and once the drawings were completed, attributes of the insect (such as type of insect, the number and types of appendages, etc.) and details of any background (such as flowers, hives, etc.) were noted. The children were then asked to respond to a short listof questions. Differences in the children's impressions of insects, if any, were recorded between the two age groups as well as stereotypical impressions and preferences of boys and girls.

Some results were as follows...

Most popular orders: Hymenoptera and Lepidoptera

Most popular subjects: butterflies > bees > ants > spiders >ladybirds

Attitudes to insects: more in kinder like insects (*ca.* 80%) than in grade 4 (*ca.* 65%)

Attitude reasons: look nice, fun to play with, interesting, fun to squish, vague positive, vague negative, bite/sting, like some but not others, annoying, no reason/don't know, disgusting/stink/yuk, cause disease/allergy, can scare people, positive because they don't bite/sting and useful/beneficial

Seen insect movies: kinder, *ca.* 70%; grade 4, *ca.* 90%

Own insect toys and games: kinder *ca.* 55%; grade 4, *ca.* 75%

Played insect video games: kinder *ca.* 40%; grade 4, *ca.* 80%

This is an important study and one that needs following up to find ways to redress the negative perceptions that not only country children have, but also city children, teenagers and adults. For more information contact Gina Dillon directly: P.O.Box 271, Narrabri NSW 2390.

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[Trevor Semmens retired from DPIWE on 18 February. Best wishes to Trevor for a busy and productive retirement! — *Ed.*]

Editorial

In 1992 your editor gave a talk in the 'Last Chance' conservation lecture series organised by the Threatened Species Network. The talk highlighted the failure of our Parks and Wildlife Service to take invertebrates seriously:

> *Surely within the Department of Parks, Wildlife and Heritage there is some awareness of the need for invertebrate conservation? Indeed there is, but year after year those timid bureaucrats direct the bulk of the available funds towards the old favourites - birds and mammals - and away from the most diverse, the least well-known and the least well-conserved sections of our fauna.*

A senior Parks officer put it this way in an interdepartmental email:

> *Invertebrates don't get a fair crack of the whip. However, the reality is that we cannot drop our high profile species which society demands that we work on. We have limited budgets and limited staff so it is invariably the small and insignificant things which suffer and that usually is the invertebrates.*

I'm sorry to say that this email was written in December 1999. The Service has changed its position in the State departmental hierarchy a few times since 1992, but its fauna conservation motto still seems to be 'One species at a time, birds first'.

If you go to the Parks website you'll find a wildlife page (**www.parks.tas.gov.au/wildlife/wildlife.html**), with links to mammals, birds, reptiles, frogs and invertebrates pages (no fish). The invertebrates link is tagged '*Coming soon - a resource on the forgotten animals of Tasmania* ', but the invertebrates page itself is still blank and was last updated on 10 September 1997.

It would simply be sad, or pathetic, that Parks regards 95% of Tasmania's fauna as 'insignificant' and 'forgotten' if it weren't for one thing. Parks' home Department is the State agency charged with implementing Tasmania's Nature Conservation Strategy, described on this page by TNCS project officer Niall Doran. Niall's passion for invertebrates and his expertise in invertebrate conservation are unquestioned. His appointment, however, is temporary. Within DPIWE, the TNCS project is being managed by the same long-serving Parks officer who told us in *Invertebrata 13* that '*protecting large and mobile species like birds, can by default, help a lot of others along the way.*'

It would be nice to think that the TNCS, when it lands on a desk at Parks for implementation, will stress that the 'fauna' in 'fauna conservation' is overwhelmingly invertebrate, and that it's time for the *science* of fauna conservation, rather than its *politics*, to inform what Parks does in this area. We can only hope that the TNCS will change the thinking of Parks officers who for so many years have valued invertebrates principally as birdfood.

Developing Tasmania's Nature Conservation Strategy

The State Biodiversity Committee has begun work on developing a Tasmanian strategy in line with the The National Strategy for the Conservation of Australia's Biological Diversity. Tasmania's Nature Conservation Strategy (TNCS) is planned to encompass both biodiversity and geodiversity issues, in recognition of the interaction and interdependence of biotic and abiotic factors within ecosystems. The aim of the strategy is not to replace or commandeer existing conservation programs and actions, but instead to identify gaps between these programs that need to be addressed through other means, and to identify overarching conservation objectives and priorities for Tasmania that can act as a guide in directing existing programs.

TNCS will refine the general issues raised in the national strategy to fit within a Tasmanian context. The document will strive not just to identify overall objectives and ideals, but to outline the specific actions that are required to meet these conservation needs. To this end, it is intended that the development of TNCS will include the drafting of a practical implementation and funding program, and a clear system for performance review according to distinct and measurable outcomes.

While the State Biodiversity Committee will formally contact relevant organisations and individuals as the process gets underway, the Biodiversity Unit would welcome input or expressions of interest from anyone who would like to contribute. This may range from direct comment on relevant issues to simply providing contact details so we can list contributors as interested people and include them on our mailing list.

One issue critical to the success of TNCS, and of direct interest to readers of *Invertebrata*, is the treatment of those groups that are usually overlooked in conservation funding but which are the mainstay of biodiversity: the invertebrates, micro-organisms and non-vascular plants. Regarding invertebrates, we would particularly like to receive comments from people as to which groups, locations or issues they regard as priorities for attention under TNCS. While I realise that this is a big ask (both in the face of our limited knowledge of invertebrates as a whole and natural biases towards our own favourite invertebrate groups!), it is also an important step in ensuring that TNCS will properly address the conservation issues and achieve the biodiversity outcomes that it should.

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'Zit zit' revealed

In the *Invertebrata 15* editorial I mentioned an insect making a 'zit zit' noise in a NW garden. Dave Rentz (CSIRO Entomology) suggested the singer was the green katydid *Caedicia simplex*. I finally caught a 'zit zit' and it is, indeed, *C. simplex*.

Songs of *C. simplex* and 44 other orthopteroids can be heard on the audio CD *Nature Sounds of Australia* (Sound Heritage Association, 1997), which can be purchased online for $24.95 from the Australian National Insect Collection bookshop, **anic@ento.csiro.au**. The accompanying booklet has colour photos of the animals recorded, plus short essays on mechanisms and uses of sound production in various animal groups. The *Nature Sounds of Australia* project was coordinated by Dave Rentz, who broadmindedly allowed bird, mammal and frog noises to be included among the magnificent tracks of orthopteroids, cicadas and crabs.

- Ed.

More information:

Rentz, D.C. 1996. *Grasshopper Country: The Abundant Orthopteroid Insects of Australia*. Sydney: University of New South Wales Press; 284 pp.

Hunting the burgundy snail

For anyone who has ever been out collecting with a snail expert, identification of Tasmanian land snails is somewhat tricky to say the least. However, the burgundy snail, *Helicarion rubicundus*, with its impressive red and green colouring and red mucus, is a dead giveaway.

H. rubicundus is a rare species, being restricted to wet sclerophyll forests on the Forestier and Tasman Peninsulas. In 1999 the species was included in the schedules of the *Threatened Species Protection Act 1995*. To better define its range and reservation status, a survey was conducted during May and June 1999 and presence and absence data collected by other researchers were collated (Otley *et al.* 1999, Taylor 1991). At each site surveyed, snails were hunted in shelters such as curled bark, logs, and cutting grass for 30 minutes or until an adult *H. rubicundus* was found.

H. rubicundus has now been recorded at 61 sites on the Forestier Peninsula. It appears to have a possibly continuous distribution in the southern part of the Peninsula, with a more patchy distribution north of (approximately) Hylands Road. On the Tasman Peninsula the species was located at nine sites over a 5 km N-S range between Arthurs Peak and Balts Road. The snail was less easily found within its range on the Tasman Peninsula compared to the Forestier Peninsula. No *H. rubicundus* were found further south along Fortescue Bay Road, west of Arthur Highway or east of Tatnells Hill Range.

H. rubicundus occurs in Abel Tasman National Park, numerous small informal reserves in State forest and also on private property.

The species appeared to be more common in wet sclerophyll forests containing eucalypts that copiously shed smooth bark in long sections, such as *Eucalyptus viminalis*, *E. globulus* and *E. regnans*, as compared to fibrous-barked species such as *E. obliqua*. However this difference in rate of occurrence between forest types was not statistically significant. In general, Tasmanian land snails seem to be unconcerned by differences in the eucalypt species present in their habitat.

H. cuvieri, a far more widespread and less fancy cousin of *H. rubicundus*, was more uniformly distributed across the Forestier and Tasman Peninsulas. It was observed that *H. cuvieri* generally showed a greater variation in body colour (black, chocolate brown and orange) at sites where *H. rubicundus* was absent and more black individuals were present at sites where the burgundy snail was present. This suggests that more intensive searching for *H. rubicundus* may be needed at sites with a high density of darkly coloured *H. cuvieri*.

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More information:

Taylor, R.J. 1991. Distribution and habitat of *Helicarion rubicundus* (Pulmonata: Helicarionidae), a rare land snail. *Papers and Proceedings of the Royal Society of Tasmania* 125: 27-28.

Otley, H., Bonham, K. and Taylor, R. 1999. Distribution of the burgundy snail *Helicarion rubicundus* on the Forestier and Tasman Peninsulas. *The Tasmanian Naturalist* 121: 42-47.

Become immortal!

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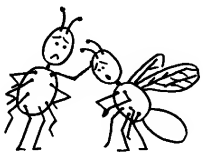
You can help us to name our indigenous species and fossils. By supporting the Immortals Program you will be assisting our understanding and conservation of native biodiversity. A donation of $5000 to the Immortals Program will be acknowledged by using your name for a previously unnamed invertebrate animal, and so your name will be preserved forever in the annals of science. You will also receive a free membership to The Australian Museum Society (TAMS) for one year and free entry to the Museum for a year.

To become involved in the Immortals Program, or for further information, contact the Australian Museum at:

Immortals Program
Australian Museum
6 College St
Sydney NSW 2010
ph (02) 9320 6277 (Trish McDonald)
fax (02) 9320 6074

Black day in Bugville: *Buzzus fredbloggsi* is placed in synonymy with *Buzzus vulgaris*.



'How can I ever look Mr Bloggs in the face again?'

QVM Capers

Recent months at the QVM have seen the spring/summer seasonal influx of zoological public inquiries - all things that either creep, crawl or fly.

A highlight of these inquiries arrived by mail in early December from a sharp-eyed resident of Marrawah in northwest Tasmania. The consignment in a stock-cube container consisted of two butterflies which turned out to be the Caper White, *Belenois java* (Linnaeus, 1768) (Lepidoptera: Pieridae).

Although noted for its mass migratory movements on mainland Australia, *B. java* are only occasionally reported in Tasmania. To date, QVM records for this species have been from Devonport, Kelso and Albatross Island. The Marrawah report noted 'quite a number' of specimens seen on only the one day, flying around trees on a forest margin as well as in an adjacent garden.

So watch out in November/December for a white butterfly slightly larger than your common-or-garden Cabbage White, and with more black markings on the wings.

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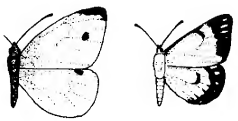

Cabbage White (left) and Caper White (right), from: New, T.R. 1996. *Name That Insect. A Guide to the Insects of Southeastern Australia.* Melbourne: Oxford University Press.

Memorial

Two of Australia's acarologists have passed away in the last two years.

Dr Ronald Vernon Southcott died in April 1998 at the age of 79. R.V. Southcott was a distinguished worker in botany, medicine and marine biology as well as acarology, and was chairman of the South Australian Museum from 1972 to 1982.

Dr Glenn Hunt died in September 1999. Best known in Tasmania for his taxonomic work on cavernicolous and other harvestmen, Dr Hunt had spent the last seven years at the Australian Museum extending our knowledge of oribatid mites. He will be remembered by local contacts for his good humour and his enthusiasm for arachnology.

QVM Shapers

My year of power and glory is now over, Tim Kingston is back in the Zoology Curator's chair and I am back as Research Associate spending more time with molluscs.

I attended the 'Southern Connections' conference in Christchurch, New Zealand in January and spent an interesting week hearing about other flora and fauna elements (apart from snails) and their Gondwana relationships. I presented a poster paper on a new snail from South Georgia found by members of the British Antarctic Survey.

Recently two live snails were brought to the QVM by Quarantine officers. Both snails were taken from grapes imported from northern Victoria. If any other invertebrate worker in Tasmania has these little beasts brought to them, please suggest that the finder lodges them in a museum, as we like to keep track of these records. The snails were two species of Helicidae that we already have as introductions in Tasmania, but we still like to know about these events.

The native snail *Bothriembryon tasmanica* occurs in a strip about 5 km wide up the East Coast and along the South Coast of Tasmania. Not long ago I had a recently dead specimen brought in from Little Musselroe Bay in the Northeast. This is the most northerly record we have of this species. Does anyone know of a more northerly authenticated record of this species?

I also had a specimen of what I used to call a lamellariid marine gastropod brought in. It was a specimen of *Mysticoncha wilsoni* - with a large internal shell and brightly coloured body. On looking it up in the latest *Fauna of Australia* volume on Mollusca (*The Southern Synthesis*) I notice that Lamellariidae has become a subfamily in the family Velutinidae.

As you can see, now that I have had the heavy mantle of Curator of Zoology lifted, I am getting back into the day-to-day delights of molluscs, namely research, public enquiries and curation, and I'm thoroughly enjoying it. Welcome back, Tim.

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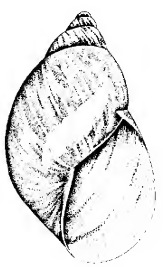


[*Bothriembryon* (right); drawing by Rhyllis Plant from Smith, B.J. & Kershaw, R.C. 1981. *Tasmanian Land and Freshwater Molluscs. Fauna of Tasmania Handbook No. 5.* Hobart: Fauna of Tasmania Committee, University of Tasmania.

M. wilsoni has missed out being included in recently published marine guides for our area. You can find an eye-opening portrait of this gorgeous animal in Neville Coleman's *What Shell Is That?* (Sydney: Ure Smith, 1998; reprint of the second edition published in 1981 by Lansdowne Press) - Ed.]

How to... ...age and sex a flatback millipede

The drawings at right are a kind of flatback growth chart. Like all arthropods, millipedes can only grow by shedding their hard exoskeleton and making a new, bigger one. Most flatback millipedes (order Polydesmida) do this in a remarkably regular way. At each moult they add legs at the hind end, and the leg-adding pattern is so regular that you can age a flatback just by counting legs.

The drawings show the eight mobile life-stages, called *stadia* (singular *stadium*), in the development of a typical 20-ring flatback (more on that '20-ring' shortly). These drawings, of course, are NOT to scale. In reality, stadium **I** might be only one-tenth the body diameter of stadium **VIII**, and one-tenth the length. Note also that only the legs on one side of the body are drawn.

Look first at stadium **I**. At the left end is the head with antennae. There are no eyes - all Polydesmida are blind. Immediately behind the head is the collar-like *collum* which partly covers a leg-bearing segment. Next are two segments with one pair of legs each, then two legless (*apodous*) segments. At the rear end is the complex structure called the *telson*, which is always legless.

A stadium **I** flatback thus has six legs, like an insect. As the flatback grows and moults, it adds segments and legs as shown in the drawings and the accompanying table. No other animal group on Earth grows in just this way. In 20-ring species, stadium **VIII** is the final life-stage, the one in which the millipede mates and dies.

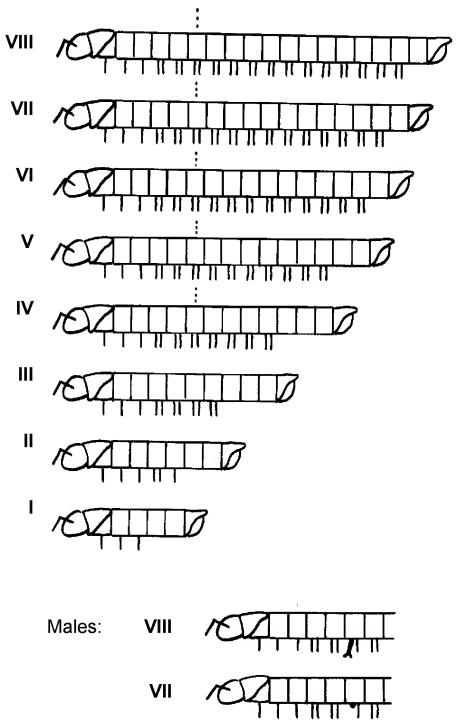
Male 20-ring flatbacks in stadia **IV**, **V**, **VI** and **VII** are missing their eighth pair of legs. This is the first pair on ring 7 counting back from the head, the ring marked with a dotted line in the drawings. Instead of legs, immature males have a pair of low, rounded bumps at this position (see lower sketch for male stadium **VII**).

When 20-ring males become mature in stadium **VIII**, they suddenly produce a pair of weirdly shaped structures called *gonopods* in place of those missing legs (lower sketch for male **VIII**). Gonopods are used for sperm transfer in mating and have complex, almost indescribable shapes which are characteristic from species to species. (Millipede collector's lament: 'Lousy day. I only saw females and juveniles.')

You now know how to age and sex a 20-ring flatback. However, there's one more variation. '20-ring' flatbacks are called that because they have 20 'rings' behind the head in stadium **VIII**, I.e. the collum, 17 leg-bearing segments, 1 apodous segment and 1 telson. There are also 19-ring flatbacks. These grow in just the same way as 20-ring species, but they mature and die in stadium **VII**. In male 19-ringers, the gonopods appear in stadium **VII** after lurking unformed behind low bumps in stadia **IV**, **V** and **VI**.

As you might expect, 19-ringers tend to be a little smaller than 20-ringers, but not always. In the Tasmanian fauna, the common 19-ring species *Tasmaniosoma armatum* is a lot bigger in stadium **VII** than some of the smaller 20-ringers in stadium **VIII**.

Tasmania has more than 100 native species of flatback millipede, and two known introductions. Polydesmida are everywhere and usually fairly abundant. Adults range in size from 4 mm to 30 mm long, and there may be as many as 15 species living in a small patch of forest or scrub. I study the taxonomy and biogeography of Tasmanian flatbacks, and I'm always happy to receive specimens which have an accompanying label stating collector's name, date of collection and locality (preferably a map grid reference). However, I can only positively identify male **VII** 19-ringers and male **VIII** 20-ringers, with fully developed gonopods.



Stadium	I	II	III	IV	V	VI	VII	VIII
total rings	7	9	12	15	17	18	19	20
1-pair rings	3	4	3	3	3	3	3	3
2-pair rings	0	1	4	7	10	12	13	14
leg-pairs:								
male	3	6	11	16	22	26	28	30*
female	3	6	11	17	23	27	29	31

* plus gonopods

Test your skill at sexing and ageing flatbacks with the illustrations on p. 9. The correct answers are on p. 1.

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[Invertebrata *is grateful to John Moss for permission to reprint in full the following article, which first appeared in the hard-to-find* Queensland Naturalist ***29***(3-6): 102-106 (1989). *Tasmanian cicada enthusiasts are invited to contact Dr Moss at the address given at the end of the article.*]

Notes on the Tasmanian cicada fauna with comments on its uniqueness

Introduction

This paper summarises the cicadas recorded on the Queensland Naturalists' Club excursion to Tasmania between the 9th and 23rd January, 1988. Brief mention is made of earlier collecting by the author in February 1978. January being the middle of summer was an ideal time to record cicadas which generally have a life history involving maximum emergence of adults in the warmer months. A total of six of the recorded eight species was found although further studies will probably show one of these to be a complex of two or three sibling species.

Species notes

1. *Cicadetta torrida* (Erichson, 1842). This medium-sized species (body length 20 mm; wing spread 55 mm) was found to be the most widespread and numerous cicada in Tasmania, occurring in most ecozones except for the subalpine heathlands and wetter parts of the south-west. It is a species which also occurs coastally in Victoria and which is characterised by dark brown to black colouration with clear wings (except for a small black spot near the apices, due to slight infuscation of the terminal cross veins). Its song resembles the croaking of a frog, although one population has a ticking call, quite distinct and constant. The 'croaking' group were mainly coastal in distribution and the 'ticking' tended to occupy the more densely forested interior regions.

The 'croaking' group appears to have resisted settlement changes and individuals were common even in suburban areas on exotic trees. There were large numbers on exotic oaks and conifers at Entally House near Launceston. At Ocean Beach on the west coast, and near Port Arthur on the east coast, they preferred the stunted, wind-blown, dune vegetation habitat, clinging to dominant *Melaleuca ericifolia*, *Epacris impressa* and other shrubs. At Ocean Beach females were found ovipositing on *Leptospermum glaucescens* and at Port Arthur on *Helichrysum purpurascens*.

At Lake St Clair individuals of both groups were present, while at Chain of Lagoons on the east coast 30 km north of Bicheno, in recently burnt dry sclerophyll forest, a third group of consistently smaller size (b.l. 15 mm; w.s. 40 mm) and significantly different song, was found. Tape recordings were obtained, of the songs of individuals in all three groups, for sonographic analysis.

2. *Cicadetta abdominalis* (Distant, 1892). This medium-sized species (b.l. 20 mm; w.s. 55 mm) was located in only one area, namely the Freycinet Peninsula on the east coast. It also has a wide distribution in the southern highlands of the mainland.

However, locality data on specimens held in the Department of Agriculture insect collection show that it has a wider distribution in eastern Tasmania, with dates of collection from late November to January. This species is characterised by bright orange and scarlet red markings on a dull brown to black tomentose body. In the male the red markings are quite striking on the genitalia and pregenital abdominal segment. The wings are clear and unspotted. Its song is a high-pitched, almost inaudible 'grasshopper-like' call. At Wineglass Bay I collected one specimen only, a female ovipositing on a sapling *Eucalyptus viminalis*.

3. *Pauropsalta* sp. near *P. encaustica* (Germar, 1834). This small species (b.l. 15 mm; w.s. 35 mm) is one of a species complex occurring over a wide area of the coastal eastern and southern mainland. Alhough it has yet to be studied in detail, it appears to be distinct from others already described in the complex (Ewart, in press). It was collected at Bicheno and the nearby Freycinet Peninsula on the east coast (mainly on eucalypts), but only where there were granite formations. Its song is a fast ticking call and like others in the complex it prefers to sing in sunshine, generally becoming silent once clouds obscure the sun.

4. *Diemeniana euronotiana* (Kirkaldy, 1909). This smallish species (b.l. 15 mm; w.s. 40 mm) was initially encountered in the wallum near Port Latta on the north coast. It was found in large numbers on bracken, *Banksia marginata* and *Leptospermum scoparium*. We also encountered it on the south-east coast near Port Arthur in the same habitat as *C. torrida*. However, at Nine Mile Beach near Swansea (adjacent to the Freycinet Peninsula) it occurred on introduced dune-stabilising marram grass (*Ammophila arenaria*) (although bushes of *Acacia sophorae* were growing in the vicinity).

It is generally a montane (subalpine) species on the mainland, being found south from the Dorrigo area along the Great Dividing Range through New South Wales, the Australian Capital Territory and into Victoria where it also occurs in some coastal districts. I found no difference in form or song to suggest that it is not the same species as on the mainland (Burns, 1958).

Species in this genus are atypical of cicadas in appearance, being more dorsoventrally flattened, and also more hairy than species in other genera (with the exception of genus *Tettigarcta*). They also have shorter, broader wings in relation to body length. Moreover, the closed wings are held in a slightly more horizontal rather than the usual tent-like position when at rest. This gives them the superficial appearance of a beetle.

The general colouration of this species is unusual for a cicada in so far as the body has golden pubescent splashes on a dark brown to black pilose background. The hyaline forewings have a subapical brown infuscation often appearing as two spots. The song of *D. euronotiana* resembles the whining sound made by an electric circular saw, or it can be likened to the strings of a musical instrument such as a viola being plucked repeatedly in succession. Although generally preferring to sing in bright sunshine, at Port Latta we found them calling in overcast conditions. The only three specimens available for study in the Agriculture Department's collection were from Elliott, Somerset and Lindisfarne; each had January collection dates. This species was not encountered in February 1978.

5. *Diemeniana hirsuta* (Goding and Froggatt, 1904). This species was found to be purely alpine or subalpine in its distribution. Small numbers only were encountered and very few collected in heath vegetation: (1) adjacent to the Lake Highway (near Pencil Pine Lake) in the Great Lake region at 1210 metres elevation; (2) at Cradle Mountain (elev. 1500 m); (3) on Wombat Moor in the Mt Field National Park (elev. 1080 m);

(continued on page 7)

(continued from page 6)

and (4) at 780 m elevation in the Hartz Mountains. Among the dominant vegetation of these subalpine areas was the sedge *Gymnoschoenus adjustus* or 'Button Grass' which has a spent inflorescence to which the cicada bears some resemblance. It may therefore not be coincidental that cicadas preferred to alight on this sedge even when some larger shrubs were present.

The song of this cicada is similar to *D. euronotiana*, and is best likened to the sound of an electric bandsaw in operation. Unlike the song of *D. euronotiana*, the individual notes (pulses) are harder to discern. At both Cradle Mountain and the Hartz Mountains, specimens were collected whose songs were prefaced by a fast succession of ticking notes. Examination has shown them to be no different from those others collected at the same sites and elsewhere.

This is larger than the preceding species (b.l. 20 mm; w.s. 50 mm) and is pilose and generally black dorsally in colour with paler (almost yellow) mesothoracic markings. The underside is black with peach to orange-coloured edging to abdominal sternites. The colour of the opercula varies from black, through reddish-brown to tan. The lightly smoky fore-wings have a subapical two spot black infuscation (similar to *C. torrida*).

Although no females were found ovipositing, a newly emerged male specimen was found clinging to a stunted *Orites revoluta* (Proteaceae) on Wombat Moor, which may indicate this to be a nymphal food plant. Specimens in the Agriculture Department's collection are all from alpine or subalpine regions with collection dates in February and March. This species was also collected in mid-February 1978, in the Great Lake area.

6. *Tettigarcta tomentosa* White, 1845. This so-called 'Hairy Cicada' is the endemic Tasmanian species of the primitive cicada family Tettigarctidae. The only other known species in this family is the Australian mainland subalpine species *T. crinita* Distant 1883. Although adults were not sighted on this occasion, several discarded nymphal exuviae were collected in wet sclerophyll forest near the Tahune Bridge on the Huon River, about 50 km southwest of Hobart, at about 80 m elevation. The habitat of this species includes temperate rainforest, wet sclerophyll forest and subalpine snow gum woodland.

A study of the Agriculture Department's light trap material revealed specimens caught in lowland areas of southern Tasmania in the months of May, June and July and on Mt Wellington in February. As with *T. crinita*, a colder month activity period appears preferred in contradistinction to all other Australian cicadas (of the family Cicadidae) whose adults prefer a spring/summer/early autumn activity period.

Evans (1941) states that '*the present distribution of* Tettigarcta *suggests that it forms one of the components of the cold climate fauna that was dominant in these regions for periods both in mid and late Tertiary times.*' Nowadays we would refer to this family as Gondwanaland fauna. He further suggests that 'T. tomentosa *has retained a climatic rhythm which it acquired during a glacial epoch, since early winter temperatures that prevail between two and three thousand feet in Tasmania at the present day, may well be comparable to those that prevailed at sea level during the short summer months of a period of intense cold.*'

Although possessing rudimentary sound organs, these insects are incapable of sound production in the way that is done by cicadas in the famly Cicadidae. Moulds (in press) gives a full account of this species and the related *T. crinita*.

Discussion

With the exception, perhaps, of *T. tomentosa*, there has never been a comprehensive study of the cicada fauna of Tasmania. Collecting of cicadas has been done professionally in relation to agricultural activities and by amateurs in general nature studies, such that there has built up a general knowledge of the approximate number and distribution of species. G.H. Hardy (1918) produced a key to the Tasmanian Cicadidae, listing twelve species of which only eight were represented in his collection by Tasmanian specimens. Of the remaining four, he considered that one, *Cicadetta spreta* (Goding & Froggatt 1904), was a synonym of *C. torrida* - although this was not formalised. Further study should elucidate this point. Contemporary workers agree that another two, viz. *Pauropsalta mneme* Walker 1850 and *P. marginata* (Leach 1814) are not Tasmanian cicadas (Moulds, in press and Ewart, in press). The fourth, *D. coleoptrata* (Walker 1850) = *D. tasmani* Kirkaldy 1909, was recorded by Burns (1957, 1958) from the dubious record of a 'freshly emerged specimen', with no date or place of capture, in the insect collection of the Tasmanian Museum, Hobart. It is considered here that this is not a Tasmanian species.

To the half dozen recorded on this recent survey could be added only two more. Only one of these, *Psaltoda moerens* (Germar, 1834) (the large 'Red Eye'), which is also a south-eastern coastal mainland species, is a common Tasmanian cicada, although it was absent both during the time of our visit and during the February 1978 visit. It apparently has fixed broods and the summer of 1987/88 was not a brood emergence year. However, I have been informed that in the summer of 1988/89 there were very large numbers of this species in evidence. Both the Tasmanian museums and the Department of Agriculture were inundated with enquiries from the public curious about this large and loud species. The only other species recorded from Tasmania, *Diemeniana tillyardi* Hardy (1918), which I had collected previously (1978) on the west coast, appeared to be absent on this occasion. However, its peak emergence time may possibly be later in the summer as I originally collected it in mid-late February. Its preferred habitat is the sedgelands and it is not generally found in the higher alpine/subalpine regions where its near relative *D. hirsuta* is most common.

Although the Tasmanian cicada fauna

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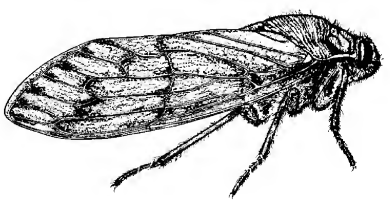

Tettigarcta tomentosa. Drawing by G. Monteith from:
CSIRO, *The Insects of Australia* (2nd ed.). Carlton: Melbourne University Press, 1991.

(continued from page 7)

is poor in quantity, there is a uniqueness about its species (even those shared with the mainland), particularly in relation to their evolutionary adaptations to colder climates. The New Zealand fauna shows some similarities in regard to this cold adaptation with species being generally dark and pilose (with some brighter exceptions). Although not closely related to the New Zealand genera, the Australian *Diemeniana* show convergent evolutionary features suggesting exposure to similar climate epochs.

Acknowledgements

I am grateful to the Tasmanian Department of Lands, Parks and Wildlife for giving me permission to collect specimens for scientific study. Dr Peter McQuillan of the Department of Agriculture, New Town, Hobart, kindly allowed me access to the Department's insect collection. Also I would like to extend my appreciation to other members of the party for assistance in collecting specimens, naming foodplants, photographing specimens, etc. Finally my thanks to Miss D. Graham for typing the manuscript.

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Hardy, G.H. (1918) Tasmanian Cicadidae. *Pap. Proc. Roy. Soc. Tas. 1917*: 69-71

Moulds, M. (in press) *A Guide to Australian Cicadas*. N.S.W. University Press, Kensington.

News from the Uni

Peter McQuillan has several new honours students at work this year.

Rachel Anderson is researching aspects of the comparative biology of the threatened Ptunarra Brown Butterfly (*Oreixenica ptunarra*) and contrasting it with that of its coextensive common relative, the Silver Xenica (*O. lathoniella*). In addition she will examine the survival and performance of their larvae under conditions of elevated soil fertility under native *Poa* tussock grassland. Foodplant quality is one of several possible factors which might explain the observation that some metapopulations of *O. ptunarra* thrive on sheep-grazed farm pastures which are occasionally fertilised with superphosphate, in addition to nutrient inputs from stock excreta. Effective management of the Ptunarra Brown on private land is critical to its long-term survival and there remains a large unmet demand by farmers for good advice.

Belinda Yaxley is contrasting the community structure of invertebrates on eight species of Tasmanian native conifers within the core range of the hostplants and in outlying populations. Although many northern hemisphere conifers support well-studied invertebrate communities, little is known of the organisation of conifer faunas in southern Australia.

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Another view of invertebrate taxonomy...

'What sort of insects do you rejoice in, where YOU come from?' the Gnat inquired.

'I don't REJOICE in insects at all,' Alice explained, 'because I'm rather afraid of them — at least the large kinds. But I can tell you the names of some of them.'

'Of course they answer to their names?' the Gnat remarked carelessly.

'I never knew them do it.'

'What's the use of their having names' the Gnat said, 'if they won't answer to them?'

'No use to THEM,' said Alice; 'but it's useful to the people who name them, I suppose. If not, why do things have names at all?'

'I can't say,' the Gnat replied.

(Lewis Carroll, *Through the Looking Glass*, Chapter 3)

Historical footnote

Many curious and beautiful descriptions of the beetle are seen, three or four sorts of ants - some of which are a full inch in length, and sting sharply - various sorts of spiders, mosquitoes, &c, &c, including a numerous tribe of insects such as are common in all countries.

— 'Natural History', p. 31, in *The Van Diemen's Land Annual for the Year 1834*, Tasmanian Facsimile Editions No. 5. Moonah (Tas.): Melanie Publications, 1982

News of WHA invertebrates

Impacts of fire on invertebrates

This project aims to investigate the role of fire in invertebrate biodiversity in buttongrass moorlands and to provide advice to land managers on burning regimes appropriate for invertebrates. The study began in 1998 with the establishment of 12 research grids at McPartlan Pass near Lake Pedder. The grids have been sampled for the past three years and it is expected that three grids will be burnt this autumn and three in spring. The grids are surveyed using pitfall traps and sweep nets. The dominant invertebrate groups are spiders, flies, collembolans, mites and hemipterans. Many other groups are also collected. The program has expanded in 1999 to include a high-altitude site at Lake St Clair and a low productivity site also at McPartlan Pass (the other McPartlan site is more fertile). After the samples are sorted to order they are sent to specialists for identification to species or morphospecies. Any specialists who may be interested in this project should give me a call. It is hoped the project will continue for several years.

Trichopterans

In summer 1998/99, Jean Jackson undertook a survey of threatened caddisflies for the WHA fauna program. As reported in the July 1999 *Invertebrata*, the survey was very successful with two species recollected which had not been seen since 1965. The sampling also yielded many undescribed species which will be described by Arturs Neboiss.

Allanaspides hickmani

Allanaspides hickmani is restricted to a small area (less than two square kilometres) of buttongrass moorland at McPartlan Pass near Lake Pedder. It is currently listed as rare in the *Threatened Species Protection Act 1995*. In July 1999 a study commenced to document distribution, life history parameters and effects of fire. As part of this study a simple trap was developed to enable live capture and release of animals. For further information contact the author.

Caves

Surveys of cave fauna in Exit and Mystery Creek Caves have continued on a monthly basis since August 1998 and are due to be completed in July 2000. This information will provide baseline data on invertebrate numbers against which future impacts may be compared, for example from increased recreational visits to Exit Cave. The survey will also provide population ecology data on a number of cave species, particularly glowworms, cave crickets and cave spiders.

Stefan Eberhard's report on cave fauna management at Ida Bay has finally been printed and is available from the Parks and Wildlife Service (address below). A companion report on Mole Creek cave fauna should be available soon.

Honeybees

Stephen Mallick recently completed his third and final field season investigating the impact of honeybees on leatherwood forests. Stephen is a PhD student based at P&WS and supported by the WHA fauna program. The main focus of the study has been the effect of honeybees on leatherwood nectar production and on native insects using leatherwood nectar. However, in the last season Stephen has focused on the impacts of honeybees on pollination, seed set and seed viability. He is also looking at the adaptive strategy of leatherwood to cope with a low and unreliable native pollination service. Stephen aims to write his PhD thesis by the end of 2000.

Lyrebirds

Lyrebirds were introduced to Tasmania in the 1930s and early 1940s because of concerns that the fox might cause the extinction of the lyrebird population on the Australian mainland . Lyrebirds were released at Hastings and Mt Field and from there have spread south to the south coast, west to Mt Anne and north to Tarraleah. Some concern has been expressed by the public about the impact of this species on a forest system that has evolved without lyrebirds. Zoe Tanner has begun an honours project to look at lyrebird impacts on invertebrates, mosses and lichens. Zoe will be based at the School of Zoology, University of Tasmania and will be supported by the WHA fauna program. It is hoped that the project will continue beyond the initial one-year honours study.

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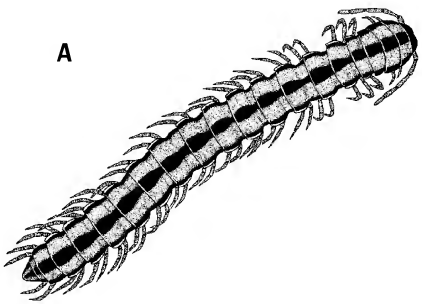
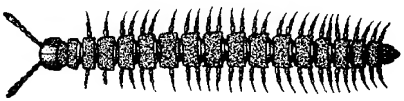
What sex and stadium? (See p. 5)

A



Drawing by Graham Milledge of an unidentified paradoxosomatid polydesmidan, from Harvey, M.S. & Yen, A.L. 1989. *Worms to Wasps. An Illustrated Guide to Australia's Terrestrial Invertebrates*. Melbourne: Oxford University Press.

B



Artist unknown. From Evans, J.W. 1943. *Insect Pests and Their Control*. Hobart: Department of Agriculture, Tasmania.

Conservation of the giant freshwater lobster *Astacopsis gouldi*

The conservation of Tasmania's unique giant freshwater lobster has taken another step towards on-ground action with the completion of the *Draft Recovery Plan for the Tasmanian Giant Freshwater Lobster* Astacopsis gouldi *Clark* (J.E. Jackson and D.R. Bluhdorn 1999). The draft plan has been submitted to Environment Australia and the Tasmanian Department of Primary Industries, Water and Environment for approval by the Commonwealth and State governments. The approval processes are described in the Commonwealth *Endangered Species Protection Act 1992* and the *Tasmanian Threatened Species Protection Act 1995*. Each includes a period of public comment, so keep an eye on the newspapers and the Environment Australia website, **www.biodiversity.environment.gov.au/plants/threaten**.

Lobster conservation is already being addressed in a Natural Heritage Trust project, 'Community Involvement in the Recovery of *Astacopsis gouldi'*. Working from Smithton, Todd Walsh has been increasing public awareness of the lobster and its needs, and monitoring some lobster populations. Thanks to Todd the lobster has featured regularly in northern newspapers.

Background

A. gouldi is the first freshwater invertebrate species to be listed as 'vulnerable' under the Commonwealth's *Endangered Species Protection Act 1992*. The species is also listed as 'vulnerable' under Tasmania's *Threatened Species Protection Act 1995* and as a 'protected fish' under the *Inland Fisheries Act 1995*.

It requires streams with good water quality, a stable thermal regime of relatively low water temperature, snags, pools, undercut banks, and ample canopy cover. Riparian vegetation needs to be substantially intact and extensive to provide the shading, nutrient, energy and structural inputs required for the species' habitat. Large-scale habitat disturbance, historically for agricultural and urban land use, and currently for forestry activity, is combining with the effects of past and current (illegal) fishing pressure to reduce both the species' abundance and the viability of some populations.

The new draft

The draft Recovery Plan is a revised and updated version of the 1997 plan prepared and submitted to the Commonwealth by David Blühdorn as required by the Tasmanian Comprehensive Regional Assessment (CRA) Endangered Species Project No. ES01, part of the Regional Forest Agreement (RFA) process. *A. gouldi* is listed in schedules attached to both Commonwealth and Tasmanian threatened species Acts. A recovery plan is to be jointly prepared (RFA clause 32) and the plan needs to be endorsed by both governments before implementation. As *A. gouldi* is a 'priority species requiring consideration' under the RFA (clauses 68-71), the Commonwealth and State governments have agreed that 'management prescriptions or actions identified in jointly prepared and agreed Recovery Plans or Threat Abatement Plans will be implemented as a matter of priority' (RFA clause 70).

The 1997 plan required updating before its submission for adoption by State and Commonwealth governments. Such adoption carries no funding commitment but Commonwealth funding is contingent on adoption. The revision is based on input from recovery team members including a review of the plan by a consultant with expertise on issues affecting management and conservation of the species.

The plan identifies actions needed for the recovery of the lobster and estimates the costs of implementing the actions.

Recovery objectives

The overall objective of the recovery program is the downlisting of *A. gouldi* from its current 'vulnerable' classification under the 1995 Tasmanian Act and the 1992 Commonwealth Act within 14 years (one lobster generation). Specific recovery objectives to be met within the five-year life of the recovery plan are:

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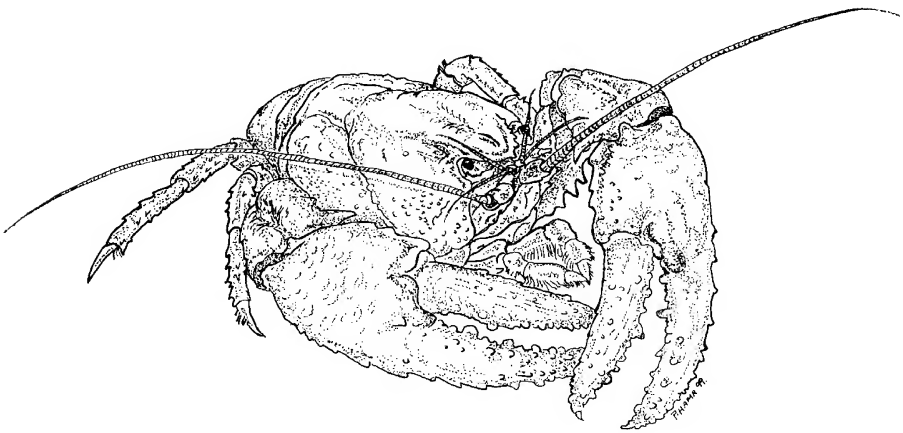

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1. Achieve a demonstrated major decline in fishing pressure.

2. Complete a survey of population abundance, recruitment and size structure at a stratified set of sites, designed to be repeated at five-yearly intervals.

3. Establish and maintain a database for detection of trends in *A. gouldi* population abundance, recruitment and structure and riverine habitat characteristics.

4. Identify and document key areas for protection across the species' range, using population survey data and an analysis of reservation status, needs and gaps.

5. Complete an intensive community awareness and education program, and assess awareness of *A. gouldi* management issues within the species' range.

6. Complete, or make significant progress with, projects aimed at filling knowledge gaps in the areas of habitat use in small streams, adult and juvenile movement, forest and agricultural habitat management prescriptions and genetic relationships between populations.

Recovery Criteria

Long term criteria (>15 years):

1. *A. gouldi* will no longer be considered vulnerable when it no longer meets any of the criteria for listing as vulnerable under the 1995 Tasmanian Act or the 1992 Commonwealth Act.

2. Protected areas of high quality habitat have been increased to contain sufficient populations to ensure the species' viability.

3. Habitat protection measures are in place on all land tenures such that potentially threatening processes have been demonstrated to have minimal adverse impact on local or downstream lobster population structure or viability.

4. Long-term population recovery will be demonstrated when impacted populations show comparable structure, recruitment and densities to undisturbed populations.

Recovery actions

Actions designed to satisfy the above criteria and achieve the recovery objectives are grouped into five principal tasks, including a number of individual actions. These are:

1. Reducing fishing pressure

1.1 Community awareness and education program
1.2 Enforcement of the fishing ban and illegal trade
1.3 Monitoring levels of illegal fishing and awareness

2. Prevention or amelioration of habitat disturbance

2.1 Habitat protection on private land
2.2 Improving agricultural practices
2.3 Improving forestry practices

3. Population and habitat monitoring and assessment

3.1 Monitoring of population recovery
3.2 Identification of key sites for protection

4. Improving understanding of *A. gouldi* biology and ecology

4.1 Habitat use
4.2 Movement and home range
4.3 Recruitment
4.4 Genetics

5. Recovery coordination

The recovery plan endorses and encourages community actions and efforts to seek funding which are compatible with the strategy for recovery, such as habitat rehabilitation and awareness activities.

Estimated cost of recovery

The estimated cost of each of the recovery actions listed above is shown in the table below. Costs are in thousands of dollars at 1999 prices.

	Action:					
Year	**1**	**2**	**3**	**4**	**5**	**Total**
1	129.9	94.7	99.9	4.5	19.1	348.1
2	105.1	90.9	92.3	3.8	16.5	308.6
3	85.7	73.6	40.4	3.8	17.3	220.8
4	75.7	86.9	17.4	6.1	17.3	203.4
5	76.3	83.2	17.4	6.1	21.1	204.1
Total	472.7	429.3	267.4	24.3	91.3	1285.0

Biodiversity benefits

By managing northern Tasmanian freshwater ecosystems for the benefit of *A. gouldi*, all other native aquatic fauna will also benefit. The Forest Practices Board (1998) Threatened Fauna Manual lists a number of threatened species which occur in *A. gouldi* habitats, including hydrobiid snails and burrowing crayfish species. Because of the intimate linkages between riparian and in-stream ecosystems, the protection of riparian zones will benefit both riparian and in-stream fauna. Functional, intact riparian zones are directly related to high stream biodiversity (Boulton and Brock 1999). There will also be benefits for the floristic diversity of production forests in the adoption of effective riparian buffers.

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Opposite: a mature male *A. gouldi* with a carapace length of 150 mm. Drawing by Dr Premek Hamr.

More information:

Boulton, A.J. and Brock, M.A. 1999. *Australian Freshwater Ecology: Processes and Management*. Glen Osmond (South Australia): Gleneagles Publishing.

Forest Practices Board. 1998. *Threatened Fauna Manual for Production Forests in Tasmania. Revised version, 1998*. Hobart: Forest Practices Board.

Invertebrates in the media

DISGRACEFUL
Worms in water

- headline, Western Herald
3 December 1999

Queenstown, on the West Coast, is one of many small Tasmanian towns with an inadequately clean water supply and insufficient funds to clean up the water. The local Council investigated various water treatment options in 1996. In 1997/98 it began work on a relatively inexpensive treatment method: chlorination by direct injection into the water mains.

Throughout that year, the West Coast Council took regular water samples and sent them away for bacteriological analysis, as did all Tasmanian water suppliers. A summary for Tasmania was prepared by the State Director of Public Health and released on 16 September 1999. This Annual Water Report said that in 1997/98 the West Coast Council had provided clean water to Tullah, Strahan and Zeehan, but that supplies to Rosebery and parts of Queenstown had been so polluted that residents should have been advised to boil water before using it.

On 30 September 1999, West Coast Council advised Queenstown and Rosebery residents to boil their water for at least the next six months.

On 1 December, Council was handed a worm by a Queenstown resident who found the living animal in a dog's water bowl. Council immediately sent the worm to the Government Analyst, who identified it as a harmless nematomorph (horsehair worm or Gordian worm; see below). Two more worms were reported, one from another pet bowl. The third find was first reported on ABC radio. A Queenstown mother was running a bath for her two-year-old daughter when she noticed a worm '7 to 8 inches long' swimming freely in the water.

What happened next was remarkable. After years of quietly putting up with water that can actually make people sick, West Coast residents were up in arms about worms that everyone accepted were harmless.

'*This may not be a health problem*,' said Premier Jim Bacon, '*but no one should expect to encounter worms in their drinking water.*'

The editor of the local weekly, the *Western Herald*, was outraged. '*The health situation on the West Coast has indeed become acute with the latest discovery of horsehair worms entering people's homes through their tap water.*'

Council's General Manager responded quickly by ordering the Queenstown water mains to be scoured. Council officers suspected the South Queenstown supply dam to be the source of the worms. The dam was emptied and cleaned out, an operation that required construction of a new access track.

At the end of December another worm was found in a dog's bowl, this time in Strahan, and a frog was found in the Gormanston supply. By this time Council had learned enough about nematomorphs to suspect that worms in dog bowls might not necessarily be coming from the water tap (see below). One frog was enough for Gormanston, however. The Gormanston supply dam will be emptied and cleaned later this year.

What happened during the West Coast 'worm crisis' hints at a folk belief: *What you can't see isn't as bad as what you can.* Bacterial pollution is apparently tolerable, but worm pollution isn't.

To the credit of all concerned, there was widespread and accurate reporting of nematomorph biology during the 'crisis'. What people noticed were the long, thin, adult worms, which mate in water or very wet soil in spring and early summer. Females lay numerous eggs in gelatinous strings in the water, then die. The eggs hatch after a few weeks or months, releasing a short-lived larval stage which encysts on vegetation at or near the water's edge.

Terrestrial nematomorphs are parasitic in insects and apparently not host-specific. When a cyst is eaten by a plant-eating grasshopper, cricket, beetle, etc., the larval nematomorph escapes from the cyst and bores into the host's body cavity. Here it digests and absorbs the surrounding tissues, growing into a long, tightly curled and leathery-bodied adult. In Tasmania, nematomorphs seem to overwinter with their hosts.

The adult worm bores out of its weakened host (and kills it) when the insect is in wet conditions or near a body of water. Some people suspect that emergence-ready worms can 'drive their hosts to drink'. In any case, nematomorph adults turn up regularly in Tasmanian fishponds, swimming pools and - occasionally - pet water bowls.

Nematomorph taxonomy is difficult and it's not clear how many species are in Tasmania. Their life cycles also need further study. If you find a nematomorph, particularly one associated with its dead insect host, please send it and the suspected host to a museum, not the local Council or the Government Analyst.

Jackson, J. & Bryant, S. 1999.
Tasmania's Threatened Fauna Handbook. What, Where and How to Protect Tasmania's Threatened Animals.
Hobart: Threatened Species Unit, Parks and Wildlife Service.

This comprehensive handbook contains site locations, maps, diagrams and information on habitat, management and protection for every threatened animal in Tasmania. Available for $40 by mail order from:

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